



Case report

Medico-legal significance of the identification of offending snake in a fatal snake bite: A case report



Anjana Silva, MBBS MPhil, Lecturer ^{a,*}, Dayal Gamlaksha, MBBS Judicial Medical Officer ^b,
Dhananjaya Waidyaratne, MD, DLM, MD Consultant Judicial Medical Officer ^b

^a Department of Parasitology, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka, Saliyapura, Sri Lanka

^b Teaching Hospital, Anuradhapura, Sri Lanka

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ABSTRACT

A 19 year old male was admitted to a tertiary care centre in Sri Lanka, with a history of snake bite while sleeping at night. A killed specimen of a snake was brought with the patient. It had been identified as a non-venomous snake by the doctor and handed over to relatives, with a comment to that effect. Patient had no clinical or laboratory evidence of envenoming on admission.

Patient developed bilateral ptosis six hours after alleged snake bite, soon followed by respiratory paralysis and was treated with Indian polyvalent anti-venom serum. After 12 h of the bite, patient had developed hypotension that did not respond to ionotropes. Despite intensive management, patient had become deeply comatose and deceased 46 h following the snake bite. Autopsy revealed features suggestive of disseminated intravascular coagulation.

Since an allegation of medical negligence too had been levelled by the relations of the patient against the clinical staff, the buried specimen of the snake was recovered by police, on a judicial order, a week later. It was found to be almost completely disintegrated and only the scales and bones were remaining. According to the scale characters, the reconstructed specimen was identified as Indian krait (*Bungarus caeruleus*).

Authentication of snake is important in investigating a death due to snake bite, especially when the snake was initially claimed to be a non-venomous snake. This case suggests the usefulness of forensic identification of species of the snake in investigating suspected snake bite cases.

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1. Introduction

Snake bite affects South Asia than anywhere else in the world with very high morbidity and mortality.¹ Identification of the offending snake often facilitates clinical management of the patient.¹ Awareness of the fact had led the public to carry offending snakes killed or alive, to hospital together with snake bite victims when possible. However, even if the offending snake is authenticated, incorrect authentications also had led to inappropriate management.^{2,3}

Some snake species are often misidentified due to morphological resemblance to other snakes. For example, hump-nosed pit vipers (*Hypnale* sp.) are frequently misidentified as saw-scale vipers (*Echis carinatus*) in Kerala, India.⁴ In Sri Lanka too, this lead to many *Hypnale* bite victims being ended up in receiving antivenom, which is ineffective. Similarly, highly venomous Kraits are often

misidentified as non-venomous Wolf snakes or *vice-versa* due to notoriously similar colour patterns.⁵

Immunodiagnostic techniques like Enzyme linked Immunosorbent Assay is increasingly being used to accurately authenticate the offending snake in snake bite cases in some countries.⁶ However, since these techniques are not yet available in routine practice in Sri Lanka, conventional snake identification methods like morphological studies are still useful.

We report a unique case where morphological identification of a disintegrated snake specimen was adopted in authentication of the offending snake in a suspected fatal snake bite.

2. Case history

A 19 year old male was admitted to the Emergency Treatment Unit, Teaching Hospital Anuradhapura at 2230 h on 21st October 2011, with a history of snake bite, 15 min ago while sleeping in a shed. The offending snake had been killed and bought to the

* Corresponding author. Tel.: +94 714400313.

E-mail address: nkanjanasilva@gmail.com (A. Silva).

hospital with the patient. It had been initially identified as a wolf snake by the attending medical officer and returned to relatives claiming that it was a non-venomous snake. Patient had no clinical or laboratory evidence of envenoming on admission, and was kept under observation.

Six hours later, the patient had developed bilateral ptosis followed by neck muscle weakness and difficulty in breathing. The patient was treated with Indian polyvalent anti-venom serum two cycles. After 12 h of the bite, the patient had developed hypotension that did not respond to ionotrope treatment. The patient also developed prolonged whole blood clotting time (WBCT), International Normalization Ratio (INR) of 5 and Activated Partial Thromboplastin Time (APTT) of 200 s. Despite intensive care management, patient became deeply comatose and died 46 h following the alleged bite.

Post mortem examination revealed petechial haemorrhages in pericardium and sub-endocardial area of heart, sub capsular regions of liver and kidneys and mucosa of stomach, indicating disseminated intravascular coagulation. Lungs were oedematous and haemorrhagic. No oedema was evident in mucosa of larynx. Kidneys were oedematous, however, with preserved cortico-medullary demarcation.

Since an allegation of medical negligence too had been levelled against clinical staff by the relations of the patient, referring to a “misidentification of snake leading to delay in treatment”, medico legal investigation warranted a need for positive identification of the snake.

The specimen of the snake, which was buried by the relatives, was recovered by police, a week later, following standard procedures of recovering evidence. On examination, the snake specimen was entirely disintegrated and areas of non-separated scales from head, mid-body and tail were recovered (Fig. 1). The vertebral scale row was found to be having enlarged and hexagonal scales (Fig. 1c) and the sub caudal scales were found to be undivided (Fig. 1b). The reconstructed area of head was having no evidence suggestive of presence of a loreal scale (Fig. 1a). Scales covering mandible were having two pairs of chin shields, equal in size. Scale

characteristics as described in de Silva⁷ firmly suggested that the snake specimen in question is of a Krait.

3. Discussion and conclusion

Wolf snake (*Lycodon aulicus*) is non venomous and commonly being encountered in home gardens in Sri Lanka. Due to its marked similarity in colouration to Indian Krait, it could be often misidentified as Indian Krait (*Bungarus caeruleus*). However, Wolf snakes do not possess enlarged hexagonal vertebral scale row or uniserial sub caudal scales. In addition, these snakes possess a pair of loreal scales which is absent in Kraits.⁷

Indian Krait is distributed in India, Bangladesh, Pakistan, Nepal and Sri Lanka. Bites by these snakes lead to high morbidity and mortality in the region, often leading to death of the victim, if not intervened.⁸ Indian Krait is known to cause most of the bites during night, when the victim is sleeping.⁹ Two species of Kraits, *B. caeruleus* and *B. ceylonicus* occur in Sri Lanka, of which the former is distributed mainly in the dry zone and the latter is endemic and distributed in wet zone. Bites by *B. caeruleus* have been commonly reported from Anuradhapura⁹ and presence of *B. ceylonicus* has never been recorded from north central province.⁷ Body colouration is being used to differentiate these two species,⁷ which however, is of no use in a completely disintegrated specimen like in this case. Characteristically, Indian Krait bites happen at night when victims are asleep in mud/clay houses or sheds,^{9,10} as in this case. With the scale characteristics, time and nature of the bite and previous records of frequent Indian Krait bites from the area,⁹ the offending snake could be authenticated as Indian Krait.

Usually, the killed snake specimens are soon incinerated in Sri Lanka. This may partly be due to the villagers' belief that the killed snake specimens attract more snakes of the same kind. However, in this case, the snake specimen has not been incinerated by the family members of the victim, probably due to the suspicion that this snake is a venomous snake, which led to this forensic examination. Since this incident occurred during the monsoon rainy

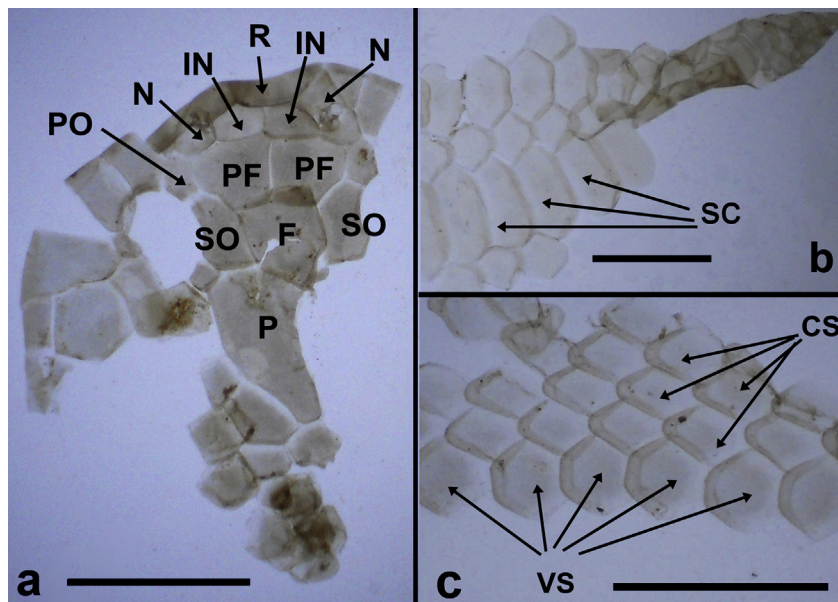


Fig. 1. Showing reconstructed scale arrangement in head (a), tail (b) and mid-body (c) of the offending snake. (a.) Arrangement of shields in reconstructed head of the offending snake: Left parietal (P), frontal (F), supraocular (SO), pre frontal (PF) left preocular (PO), nasal (N), intranasal (IN) and rostral (R). Note: No evidence a loreal scale among head shields. (b.) Caudal scales of the snake specimen: Note that the sub caudal scales (SC) are arranged uniserially. (c.) Scale arrangement in mid-body: Note that the vertebral scales (VS) are enlarged and hexagonal compared to the costal scales (CS). Scale bar = 1 cm.

season, the snake specimen probably skeletonized within a weeks. In any case, it is difficult to comment further on the time required for skeletonisation as extensive literature search failed to locate similar studies done before.

Indian Kraits cause a clinical syndrome characterized by negligible local envenoming, vomiting, abdominal pain and descending paralysis that at times start as soon as 30 min after the bite which could be delayed for up to 4 h.¹⁰ Although ptosis, external ophthalmoplegia, dysphagia, drowsiness, altered consciousness and deep coma also had been commonly reported following envenoming by this snake, reports on prolonged WBCT in Indian Krait bite victims has been very rare.⁹ On the contrary, Sri Lankan Russell's viper (*Daboia russelli*) frequently causes both neurotoxicity and coagulopathy in the victims.¹¹ However, Kularatne⁹ reported mottling haemorrhages in viscera and adrenal bleeding in one victim of Indian Krait who died due to shock, however with no clinical details. In addition, the same study revealed occurrence of mucosal haemorrhages in stomach of 3 of the 16 deceased victims of Indian Krait bite. Therefore, altered coagulation and haemorrhages as evident from the laboratory and post-mortem findings of the victim suggest rare clinical presentations of anti-coagulant effects of Indian Krait venom.

The decision on the initiation of antivenom treatment is taken on clinical grounds, often based on presence of neurotoxic signs or coagulopathy. Therefore, the misidentification of the offending snake in this particular case did not adversely affect the management of the patient. However, the accusation on medical negligence raised by the relatives of the victim highlighting the initial misidentification of the offending snake as a non-venomous snake warranted an accurate authentication of the offending snake in this case. This case suggests the usefulness of morphological identification of offending snake in forensic investigations of suspected snake bite cases.

Ethical approval

Not sought.

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Conflict of interests

None.

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